

## Claims

1. Method in a multi-layer web formation section, the method comprising the following stages:

- 5 - at least two successive wire units (300, 310, 320) are formed,
- a pulp suspension jet is supplied by a first headbox (100) to the forward end of the first wire unit (300),
- a first partial web (W1) is formed in the first wire unit (300),
- a pulp suspension jet is supplied by a second headbox (110) to a jaw (G) at the  
10 forward end of the two-wire stretch of the second wire unit (310),
- a second partial web (W2) is formed in the second wire unit (310),
- the first partial web (W1) and the second partial web (W2) are joined together at a joint (N1) between the webs (W1, W2),
- at least two successive dewatering zones (Z1b, Z2b) are formed in the two-wire  
15 stretch of the second wire unit (310) in such a way that,
- the first dewatering zone (Z1b) of the two-wire stretch of the second wire unit (310) is formed by at least one fixed first formation shoe (200b), which is located at the forward end of the two-wire stretch and which has a curved cap (201), which is placed against one side of the two-wire stretch and which is provided  
20 with openings (202) extending through the cap, and under-pressure (P) affecting through the openings (202) of the cap (201),
- a later second dewatering zone (Z2b) of the two-wire stretch of the second wire unit (310) is formed by fixed dewatering lists (210b), which are placed against one side of the two-wire stretch in the cross machine direction and between which  
25 there are gaps (220b),

**characterized** in that

- the openings (202) of the first formation shoe (200b) are formed by holes or by gaps essentially in the lengthwise direction of the machine, whereby the fibre pulp travelling in between the formation wires (41, 51) of the two-wire stretch is  
30 subjected to non-pulsating dewatering in an area after the leading edge of the first formation shoe (200b), and

- an under-pressure ( $P_b$ ) is formed in the second dewatering zone ( $Z_{2b}$ ), whereby the fibre pulp travelling in between the formation wires (41, 51) of the two-wire stretch is subjected to pulsating dewatering by the fixed dewatering lists (210b) and to under-pressure ( $P_b$ ) in the area of the fixed dewatering lists (210b).

2. Method according to claim 1, **characterized** in that in the second dewatering zone ( $Z_{2b}$ ) of the two-wire stretch of the second wire unit (310) dewatering lists (230b) are formed, which can be loaded in a controlled manner and which are located on the opposite side of the two-wire stretch in relation to the fixed dewatering lists (210b), at the gaps (220b) between the fixed dewatering lists (210b).

3. Method according to claim 1 or 2, **characterized** in that the first wire unit (300) is formed as a fourdrinier wire unit, whereby the bottom wire (11) forms the fourdrinier wire, to the forward end of which a first headbox (100) supplies a pulp suspension jet (100).

4. Method according to claim 3, **characterized** in that in the fourdrinier wire unit (300) two dewatering zones ( $Z_{1a}$ ,  $Z_{2a}$ ) are formed.

5. Method according to claim 4, **characterized** in that the first dewatering zone ( $Z_{1a}$ ) of the fourdrinier wire unit (300) is formed at the beginning of the fourdrinier wire unit (300) by a fixed second formation shoe (200a), which is located at the impact point of the pulp suspension jet supplied by the first headbox (100) and which has a curved cap (201), which is placed against the inner surface of the fourdrinier wire (11) and is provided with openings (202) extending through the cap (201), and an under-pressure ( $P$ ) affecting through the cap's (201) openings (202), whereby the fibre pulp travelling on the fourdrinier wire (11) is subjected to non-pulsating dewatering in an area following after the leading edge (203) of the second formation shoe (200a).

6. Method according to claim 5, **characterized** in that the second dewatering zone (Z2a) of the fourdrinier wire unit (300) is formed by a suction box (13), which is located at the output end of the fourdrinier wire unit (300) and which has a list cap placed against the inner surface of the fourdrinier wire (11) and an under-pressure  
5 affecting through the openings of the list cap, whereby the fibre pulp travelling on the fourdrinier wire (11) is subjected to pulsating dewatering in the area of the suction box (13).

7. Method according to claim 1 or 2, **characterized** in that a first wire unit (300) is  
10 formed as a wire unit equipped with a two-wire stretch, and a first headbox (100) supplies a pulp suspension jet to the forward end of the first wire unit into a first jaw (G1) formed by the formation wires (11, 21, 21, 31).

8. Method according to claim 7, **characterized** in that two successive dewatering  
15 zones (Z1a, Z2a) are formed in the two-wire stretch of the first wire unit (300).

9. Method according to claim 8, **characterized** in that the first dewatering zone (Z1a) of the first wire unit (300) is formed at the beginning of the two-wire stretch of the first wire unit (300) by a fixed second formation shoe (200a), which has a curved  
20 cap (201) placed against the inner surface of the first wire (31) and provided with openings (202) extending through the cap (201), and an under-pressure (P) affecting through the cap's (201) openings (202), whereby the fibre pulp travelling in between the wires (21, 31) is subjected to non-pulsating dewatering in an area following after the leading edge (203) of the second formation shoe (200a).

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10. Method according to claim 9, **characterized** in that the later second dewatering zone (Z2a) of the two-wire stretch of the first wire unit (300) is formed by fixed dewatering lists (210a), which are placed against one side of the two-wire stretch in the cross machine direction and between which there are gaps (220a), whereby the fibre  
30 pulp travelling in between the formation wires (11, 21, 31, 41) of the two-wire

stretch is subjected to pulsating dewatering by the fixed dewatering lists (210a) and by the under-pressure (Pa) in the area of the fixed dewatering lists (210a).

11. Method according to claim 10, **characterized** in that in the second dewatering zone (Z2a) of the two-wire stretch of the first wire unit (300) dewatering lists (230a) are formed, which can be loaded in a controlled manner and which are located on the opposite side of the two-wire stretch in relation to the fixed dewatering lists (210a) at the gaps (220a) between the fixed dewatering lists (210a).

12. Method according to any claim 1-11, **characterized** in that non-pulsating dewatering is performed by a formation shoe (200a, 200b, 200d), where the open surface area defined by the openings (202) of its cap (201) is 50-90 % of the total surface area of the cap.

13. Method according to any claim 1-12, **characterized** in that non-pulsating dewatering is performed by a formation shoe (200a, 200b, 200d), where the holes (202) extending through its cap (201) are located obliquely against the travelling direction of the formation wire (11, 21, 31, 51, 61) in such a way that the angle ( $\alpha$ ) between the central axes of the holes (202) and a tangent to the cap's (201) outer surface is 30-75 degrees.

14. Method according to any claim 1-13, **characterized** in that non-pulsating dewatering is performed by a formation shoe (200a, 200b, 200d), where its cap's (31) radius of curvature (R) is 1-20 m.

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15. Method according to any claim 1-14, **characterized** in that non-pulsating dewatering is performed by a formation shoe (200a, 200b, 200d) in such a way that the overlap angle of the formation wire (11, 21, 31, 51, 61) travelling over the formation shoe is 3-45 degrees, preferably 5-30 degrees, in the area of the cap (201) of the formation shoe.

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16. Multi-layer web formation section comprising:

- at least two successive wire units (300, 310, 320),
- a first wire unit (300), which has a forward end and an output end and wherein a first partial web (W1) is formed,
- 5 - a first headbox (100), which is used to supply a pulp suspension jet to the forward end of the first wire unit (300),
- a bottom wire (11), on which the first partial web (W1) formed in the first wire unit (300) is moved forward.
- a second wire unit (310), which is equipped with a two-wire stretch and where the
- 10 two-wire stretch has a forward end, where the formation wires (41, 51) form a closing jaw (G2, ), and an output end, where the formation wires (41, 51) are separated from one another and where a second partial web (W2) is formed in the second wire unit (310),
- a second headbox (110), which is used to supply a pulp suspension jet into the
- 15 jaw (G) at the forward end of the two-wire stretch of the second wire unit (310),
- a joint (N1) in between the second wire unit (310) and the bottom wire (11), wherein the second partial web (W2) is joined to the first partial web (W1) travelling on the bottom wire (11),
- at least two successive dewatering zones (Z1b, Z2b) in the two-wire stretch of
- 20 the second wire unit (310) in such a way that,
- the first dewatering zone (Z1b) of the two-wire stretch of the second wire unit (310) is formed by at least one fixed first formation shoe (200b), which is located at the forward end of the two-wire stretch and which has a curved cap (201) placed against one side of the two-wire stretch and provided with openings (202)
- 25 extending through the cap (201), and an under-pressure (P) affecting through the cap's (201) openings (202),
- a later second dewatering zone (Z2b) of the two-wire stretch of the second wire unit (310) is formed by fixed dewatering lists (210b), which are placed against one side of the two-wire stretch in the cross machine direction and which in be-
- 30 tween them have gaps (220b),

**characterized** in that

- the openings (202) extending through the first formation shoe (200b) are formed by holes or by gaps essentially in the lengthwise direction of the machine, whereby the fibre pulp travelling in between the formation wires (41, 51) of the two-wire stretch is subjected to non-pulsating dewatering in an area after the leading edge of the first formation shoe (200b), and
- an under-pressure (Pb) is arranged in the second dewatering zone (Z2b), whereby the fibre pulp travelling in between the formation wires (41, 51) of the two-wire stretch is subjected to pulsating dewatering by the fixed dewatering lists (210b) and by the under-pressure (Pb) in the area of the fixed dewatering lists (210b).

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17. Formation section according to claim 16, **characterized** in that the second dewatering zone (Z2b) of the second wire unit (310) also comprises dewatering lists (230b), which can be loaded in a controlled manner and which are located on the opposite side of the two-wire stretch in relation to the fixed dewatering lists (210b), at the gaps (220b) between the fixed dewatering lists (210b).

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18. Formation section according to claim 16 or 17, **characterized** in that the first wire unit (300) is a fourdrinier wire unit, whereby the bottom wire (11) forms the fourdrinier wire, to the forward end of which a first headbox (100) supplies a pulp suspension jet.

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19. Formation section according to claim 18, **characterized** in that the fourdrinier wire unit (300) has two successive dewatering zones (Z1a, Z2a).

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20. Formation section according to claim 19, **characterized** in that the first dewatering zone (Z1a) of the fourdrinier wire unit (300) is formed by a fixed second formation shoe (200a), which is located at the beginning of the fourdrinier wire unit (300) at the point of impact of the pulp suspension jet supplied by the first headbox (100) and which has a curved cap (201) placed against the inner surface of the fourdrinier wire (11) and provided with openings (202) extending through the cap (201), and an under-pressure (P) affecting through the cap's (201) openings (202), whereby the

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fibre pulp travelling on the fourdrinier wire (11) is subjected to non-pulsating dewatering in an area following after the leading edge (203) of the second formation shoe (200a).

- 5 21. Formation section according to claim 20, **characterized** in that the second dewatering zone (Z2a) of the fourdrinier wire unit (300) is formed by a suction box (13), which is located at the output end of the fourdrinier wire unit (300) and which has a list cap placed against the inner surface of the fourdrinier wire (11), and an under-pressure affecting through the openings of the list cap, whereby the fibre pulp travel-  
10 ling on the fourdrinier wire (11) is subjected to pulsating dewatering in the area of the suction box (13).

22. Formation section according to claim 16 or 17, **characterized** in that the first wire unit (300) is a wire unit equipped with a two-wire stretch and to the forward  
15 end of which a first headbox (100) supplies a pulp suspension jet into a jaw (G1) formed by formation wires (11, 21, 21, 31).

23. Formation section according to claim 22, **characterized** in that there are two successive dewatering zones (Z1a, Z2a) in the two-wire stretch of the first wire unit  
20 (300).

24. Formation section according to claim 23, **characterized** in that the first dewatering zone (Z1a) of the first wire unit (300) is formed by a fixed second formation shoe (200a), which is located at the beginning of the two-wire stretch of the first wire  
25 unit (300) and which has a curved cap (201) placed against the inner surface of the first wire (31) and provided with openings (202) extending through the cap (201), and an under-pressure (P) affecting through the cap's (201) openings (202), whereby the fibre pulp travelling in between the wires (21, 31) is subjected to non-pulsating dewatering in an area following after the leading edge (203) of the second formation  
30 shoe (200a).

25. Formation section according to claim 24, **characterized** in that the later second dewatering zone (Z2a) of the two-wire stretch of the first wire unit (300) is formed by fixed dewatering lists (210a), which are placed against one side of the two-wire stretch in the cross machine direction and which between them have gaps (220a),  
5 whereby the fibre pulp travelling in between the formation wires (11, 21, 31, 41) of the two-wire stretch is subjected to pulsating dewatering by the fixed dewatering lists (210a) and by the under-pressure (Pa) in the area of the fixed dewatering lists (210a).
- 10 26. Formation section according to claim 25, **characterized** in that the second dewatering zone (Z2a) of the first wire unit (300) also comprises dewatering lists (230a), which can be loaded in a controlled manner and which are located on the opposite side of the two-wire stretch in relation to the fixed dewatering lists (210a), at the gaps (220a) between the fixed dewatering lists (210a).
- 15 27. Formation section according to any claim 16-26, **characterized** in that the open surface area defined by the openings (202) of the cap (201) of the formation shoe (200a, 200b, 200d) is 50-90 % of the total surface area of the cap.
- 20 28. Formation section according to any claim 16-27, **characterized** in that the openings (202) extending through the cap (201) of the formation shoe (200a, 200b, 200d) are located obliquely against the travelling direction of the formation wire (11, 21, 31, 51, 61) in such a way that the angle ( $\alpha$ ) between the central axes of the openings (202) and a tangent to the outer surface of the cap (201) is 30-75 degrees.
- 25 29. Formation section according to any claim 16-28, **characterized** in that the radius of curvature (R) of the cap (31) of the formation shoe (200a, 200b, 200d) is 1-20 m.
- 30 30. Formation section according to any claim 16-29, **characterized** in that the overlap angle of the formation wire (11, 21, 31, 51, 61) travelling over the formation

shoe (200a, 200b, 200d) is 3-45 degrees, preferably 5-30 degrees, in the area of the cap (201) of the formation shoe.